2835 [1920, 273]. Proposed by J. L. RILEY, Stephenville, Texas.

If x, y, z, u are finite, and not all zero, and satisfy the equations

$$x = by + cz + du, \qquad y = ax + cz + du, \qquad z = ax + by + du, \qquad u = ax + by + cz,$$

and if none of the quantities a, b, c, d have the value -1, then will

$$\frac{a}{1+a} + \frac{b}{1+b} + \frac{c}{1+c} + \frac{d}{1+d} = 1.$$

SOLUTION BY H. L. OLSON, University of Michigan.

The necessary and sufficient condition that these equations shall have a set of solutions not all zero is that the determinant of the coefficients,

$$\begin{vmatrix} -1, & b, & c, & d \\ a, & -1, & c, & d \\ a, & b, & -1, & d \\ a, & b, & c, & -1 \end{vmatrix} = 0.$$

If we expand this determinant and divide by $(a+1)(b+1)(c+1)(d+1)$, which is not zero by hypothesis, we find that the condition can be written

$$\frac{a}{1+a} + \frac{b}{1+b} + \frac{c}{1+c} + \frac{d}{1+d} = 1.$$

Also solved by P. J. DA CUNHA, ARTHUR PELLETIER, A. V. RICHARDSON, C. H. RICHARDSON, H. S. UHLER, and C. C. WYLIE.

2857 [1920, 377]. Proposed by the late L. G. WELD.

A savings bank offers to pay 3% interest on deposits, the said interest to be continuously compounded, *i.e.*, compounded at infinitesimal intervals of time. What would be the amount of \$1.00 for one year?

SOLUTION BY E. J. OGLESBY, Washington Square College, New York University.

The amount of one dollar at the percentage, denoted by the fraction r, compounded n times per year is $(1 + r/n)^n = [(1 + r/n)^{n/r}]^r$. Hence

$$A = \underset{n \doteq \infty}{\text{limit}} \left[\left(1 + \frac{r}{n}\right)^{n/r}\right]^r = e^r = e^{.03} = 1.03045.$$

Also solved by H. C. BRADLEY, H. N. CARLETON, ELMER LATSHAW, ARTHUR PELLETIER, W. T. STONE, and A. L. WECHSLER.

2858 [1920, 428]. Proposed by C. P. SOUSLEY, Pennsylvania State College.

A boy can split wood as fast as his father can saw, and the father can split twice as fast as the son can saw. How should the money received for their labor be divided?

SOLUTION[1] BY C. A. BARNHART, University of New Mexico.

Let x = the number of cords of wood that the boy saws in 1 hour, and kx = the number of cords of wood that the boy splits in 1 hour. Then, $2x$ = the number of cords of wood that the father splits in 1 hour, and kx = the number of cords of wood that the father saws in 1 hour.

Then, $\dfrac{1}{x} + \dfrac{1}{kx} = \dfrac{k+1}{kx}$ = the number of hours in which the boy will saw and split 1 cord of wood, and $\dfrac{1}{2x} + \dfrac{1}{kx} = \dfrac{k+2}{2kx}$ = the number of hours in which the father will saw and split 1 cord of wood.

[1] The question is rather vague, but probably this solution makes the most natural interpretation of it: to use the time it takes each to split and saw a cord of wood as a basis for comparison of their work.—EDITORS.